move or swim by squeezing a wedge of water in the shutting of its shell: now at any crevice however small against which a body of water in violent motion wedges or drives into with a lifting force, the greater the vertical weight above, the better will the action be resisted; while, on a sloping surface to the action of water, there is but a small vertical weight to resist the wedging of water in displacing the stones. In a vertical surface, the retaining pressure is increased greatly from the thickness of two or three stones to the whole vertical height. Again, on a sloping surface, water in motion will cast substances that will fret the surface by rolling over it; whereas in a vertical surface substances can only be cast against it, and if that surface is hard enough to bear the concussion no damage will arise,—the substance of the wall always being equivalent in strength to resist the force of the sea. My observation on the continent, where the sea is rock-bound of granite, shewed me that the vertical rocks are scarcely worn, where sloping strands of the like rock are much fretted away; and where the rocks are of a crevice character, inroads are rapidly made by the sea on sloping shores by its wedging action.

Four years ago, I combined a substance nearly as dense as granite, as durable as flint, and in strength equalling, in some one or other resistance to strains or forces, any of the natural stones, and capable of any *form* and *size*.

I have *girders* of it 16 feet 6 inches long, supported at each end 3½ inches thick, 1 foot 11 inches deep. Paving above 7 feet bearing, from 2½ inches to 3 inches thick, supported only at each end by a bearing of 1½ inch for foot traffic.

I have a retaining wall 81 feet long, 7 feet 6 inches high, without any cross wall or butments; it is of the thickness of nearly three inches. I have some thousand feet of sewage conduits laid, the whole without a flaw or crack. Frost and snow will not crack its surface; water coats it rather than wears it away. It can be made in blocks of from one pound to 100 tons weight, and from one foot to any dimensions of reasonable length; and further, every block can be properly bedded and cemented together water-tight under water, at any reasonable depth: its cost less than stone of the same bulk or strength, and not more than brickwork of equal strength. For expedition, in three weeks after making it is fit for removal, for use as girders and paving.

Its application for sanatory improvements in sewage, and supply of water-conduits, and in making such a perfect system of sewage that should at all times be air-tight, yet receive water, moisture, or sewage at every foot, and from every side, is easy, together with the making of inlets and outlets, into main conduits.—I am, Sir, &c., B. W.

P.S. A 4-feet length of drain, 1 foot diameter, 1½ inches thick, will weigh about 3 cwt., a good proof of its density.

Discovery at St. Saviour's, Southwark.—A small portion of the Norman structure which formerly occupied part of the site of this ill-used church, has been brought to light within these few days past, on the north side of St. John's Chapel, now the vestry-room. It appears to be part of a semicircular apsis, probably of the original church: a string-course is visible, which is ornamented with an "indented" and "billet" moulding. Competent persons are investigating the discovery. The present state of St. Saviour's, once St. Mary Overy, full of interest and a historical landmark, is most discreditable,—to the metropolis in general and Southwark in particular. Mr. G. R. Corner, Mr. G. Gwilt, and other good antiquaries who dwell in the Borough, should look to it.

Russia and Foreign Artizans.—It is stated, that the Russian Minister of the Interior has interdicted the entry into the empire of every foreign workman, unless he can shew that he has been expressly invited by an artizan or manufacturer established in Russia, who has taken the engagement to give him work; and the police authorities have been enjoined not to deliver any permission to reside to foreign workmen, unless a domiciled Russian shall undertake to be responsible for their conduct in every respect.

RESTORATION OF HEREFORD CATHEDRAL.

Last week we referred to a county meeting which had been held, to devise means for raising the funds required to complete the works at Hereford Cathedral.* The Dean, who has exerted himself most devotedly to this restoration, stated very fully the whole progress of the works to the meeting, and it will be useful to record some portions of his address. We should mention, that the total amount of subscriptions is 13,971*l.*, and that the expenditure exceeds this by 872*l.*, still due to the contractor. Moreover, the Dean and Chapter, anxious that the parties now employed should not be dismissed, have made themselves responsible for the continuance of the works, and have entered into a contract for the restoration of the fabric of the choir, amounting to 3,108*l.*, in addition to the 872*l.* already stated to be due to the contractor.

Referring to the dean's speech: when the tower was first discovered to be in danger, the chapter incurred a cost (including the expense of examination) of about 1,100*l.*, by relieving the tower of the weight which it sustained in the incongruous late groining, and in excavating between the piers from north to south, on either side of the tower, to the depth of 10 feet, and filling the cavities with concrete. Not only was the interior of the base of the tower so strengthened, but on the south and east sides an area of 32 feet by 28 in each was so dealt with, and a somewhat smaller area also on the north side. The next care was so to brace the upper portions of the tower as to prevent the possibility of the jarring, unavoidable in the process of under-pinning the piers (for it was requisite to begin the renovation of them from the foundations), from disturbing the shattered and disjointed portions above. To this end, in the highest chamber of the tower, in which the bells are hung, the architect introduced what he termed dragon-ties,—powerful braces of cast-iron; below these again, at the summit of the internal columns of the tower (those remarkable features of this structure which line the most spacious and magnificent lantern in the kingdom) a wooden ceiling of correspondent character, with the contiguous masonry, was introduced, and at the points of contact, and bearing on the walls so attached as again to act as an effectual brace and tie all round; and again, still lower down, just above the bases of the columns already mentioned, he placed another powerful range of wrought-iron rods, of large dimensions, having in the middle of each, over the crown of each arch, a double screw, so as to allow of the straining up of the whole square of the tower, in such a manner as to secure this portion of the fabric,—awfully cracked and riven as it was,—from further dislocation by such shocks in the progress of the works as were necessarily to be guarded against.

When, contracts being entered into, they began to restore the tower, it was found the crushing process had gone on so far, that when the front stones were drawn, the core ran out as sand would do: it was in such a state as at times to make it a matter of apprehension for the workmen. Additional shores were introduced. Although five tiers of large and powerful balks of timber, one above the other, and in four rows, on the interior side of the pier, were prepared and fixed to support its enormous weight, some of these were observed to buckle and bend in a degree requiring braces and struts to strengthen them, and others, when removed, were found to be so split and shattered, that in many places the fibres of the wood were completely dissevered, whilst at the bases of them, where they were shod with iron, and rested on iron plates in the soles or timbers placed at right angles to receive them, and these on solid masonry below—these soles were observed to have started from the masonry, being, as it were, partially raised at the ends. The date of the commencement of the contract for the tower was March 22nd, 1843, that of its completion, February 27, 1847. The first pier was commenced January 10, 1844—almost a year having been consumed in the preliminary works of the contract, as, for instance, the opening of the panels on the four sides of the tower, and the restoration of their jaumbs and features, bringing them down to the level of the adjacent panels; the reparation of the fractured masonry in the spandrels of the main arches; the securing of the different portions connected with them; the re-building of the window contiguous to this pier, in the north transept, west wall, together with the restoration of the ashlar, the parapet, and corbel table above it. You will not fail to perceive that considerable time was of necessity consumed in the fixing of the shores, especially the first. The average time, however, which each pier took in its restoration was six months.

I cannot easily describe the joy experienced by all concerned in the works, together with myself, said the Dean, when we saw that beautiful tower clear of these hideous excrescences; and found that when they and the shores were removed, and all the four legs of the tower received their destined weight, and bearing, the trifling subsidence resulting from this hazardous and courageous work was hardly perceptible, scarcely appreciable; it could hardly be regarded as the necessary sinking of such a process.

After rehearsing what had been done, a specification of the works required was read; but we have not room for more of this than what relates to *repairing the choir*.

"The ancient carved oak stalls and throne to be repaired and fixed in the choir with new oak floors, with new oak carved bench end-seats, choristers' desks, and seats, &c.

The organs to be remodelled and fitted up in the south transept against the western wall.

The entrance to the choir at the west end to be by gates of wrought metal, forming part of an open screen of metal work at back of stalls, according to design.

Metal desks with branch sconce lights to be fitted up for the choristers, in the situation shewn on the several plans.

A new communion table of suitable character, according to design, to be placed at east end of choir.

The fittings of the choir will also comprise, litany desk, eagle lettern of brass, sconces for lights, &c., &c.; also crimson velvet cushions, &c., to throne and prebendal stalls, with cut pile carpet hassocks; and brass gilt rods and standards and crimson silk curtains to throne; also a rich covering for communion-table.

The floor to be laid with a pavement of encaustic tiles. The steps to the communion-table to be of Purbeck marble polished.

The three windows at east end of choir to be glazed with painted glass, according to design.

A stone pulpit to be erected against the north-west pier of the tower, and appropriate oak seats to be *provided in the nave for the congregation*."

"This I need not say, remarked the Dean, is one of the most important features of the cathedral, and requires the most solemn attention. In reference to the open screenwork and the seats in the nave, I wish to explain that this has regard to the feeling which prevails in the present day more strongly than since the Reformation, at least than since the early traces of the Reformation, that our cathedral churches should be more capable of extended accommodation for worshippers; if not at the daily services, which may nevertheless be also at no distant period appreciated, but certainly on the Sabbath, and on special occasions. With a view to this, it has been suggested that the return stalls at the west end instead of being five in number should be three on each side; thus the space in the centre between them would be sufficient to afford that portion of the congregation beyond, the opportunity of joining in the services. And I should feel a pride and pleasure if Hereford Cathedral might set the example of so desirable an arrangement, to which no possible objection can be raised." "One word on the subject of the pulpit, placed, by the architect on the plan, and on this specification, in the nave. This under the arrangement of the stalls would hardly do, and is one of those points which must undergo consideration. It was probably in his knowledge that in the memory, I believe, of people yet living in Hereford (as at Ely now) the sermon was preached in the nave, and there are plans of the cathedral extant where its position is marked. It is also a curious fact, that till a late period there was no sermon in either of the parish churches, but after the prayers the people repaired to the minster to hear the cathedral sermon."

* See p. 511, ante.

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